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EXAMINING THE E-LEARNING SATISFACTION OF STUDENTS WITH THE TECHNOLOGY ACCEPTANCE MODEL AND E-LEARNING SYSTEM SUCCESS MODEL

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Abstract: This study aims to understand students' e-learning satisfaction behaviours by employing the Technology Acceptance Model (TAM) and E-learning System Success Model. The study is built on the assumption that perceived knowledge, perceived ease of use and perceived usefulness affect students' satisfaction and in turn e-learning effectiveness. The survey data was collected from 135 students who use an e-learning system at a higher learning institute in Malaysia. Purposive and convenience sampling was chosen due to the ease of accessibility of the participants. The questionnaires were distributed to the participants via an online Google form. A 5-Likert scale was adopted in this study, and the statistical analysis of the results was performed using the IBM SPSS Statistical (SPSS) package. It is found that Perceived Ease of Use and Perceived Usefulness showcase strong statistical significance, establishing the regression model's statistical relevance. These factors are therefore crucial to ensuring that students are happy with e-learning.

Keywords: Student's satisfaction, e - learning, perceived usefulness, perceived ease of use, perceived knowledge

1. Introduction

The swift growth of the Internet and technology has prompted the education sector to adopt Internet-based learning materials for students in primary through higher education, as the demand for e-learning has been growing annually (Al-youssef, et al., 2023). The dynamics of delivery techniques in higher education are changing from traditional face-to-face to online to mixed modalities. Many educational institutions are trying to expand their online enrolment and geographic reach as they approach their physical space capacity (Rosenbusch, 2020). The educational system in Malaysia too has changed dramatically due to the country's pursuit of excellence, diversity, and relevance. Hence, the system in the country has evolved moving from conventional chalk-and-board classrooms to virtual learning settings and from note memorisation to skill-based pedagogies (Suhaidi, 2023). This process is known as e-learning, and it goes beyond a classroom, building, or site through the use of multimedia communications, computers, audio, video, or some combination of these in conjunction with other conventional delivery methods.

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E-learning is an instructional resource-sharing opportunity that encompasses all types of computer-assisted instruction and learning (Wani, 2013). Hence, the term "e-learning" can be described as the process of sharing knowledge for training and education through the use of information technology (Sabeh, et al. 2021). With the advances of digital tools, online resources, and interactive platforms, e-learning has become an essential component of contemporary education. As a result, e-learning provides several benefits, such as customisable learning experiences, a wide range of educational resources, and schedule flexibility. Although the use of e-learning platforms in the classroom supports efficient learning, there is a need to ensure that e-learning can enhance students' satisfaction with the new setting of learning. With the rising use of e-learning in educational institutions, it is critical to determine the elements that support or undermine student expectation (i.e., satisfaction) in the e-learning setting.

Prior studies highlight the importance of successful delivery, efficient use, and favourable effects on students (Masadeh et al., 2023). If E-learning in education institutions fails to deliver a satisfying and interesting e-learning environment, they run the risk of affecting student motivation, retention, and academic performance. Hence, the delivery of e-learning to satisfy the varied needs and expectations of students should be the main agenda for a successful implementation of e-learning. Previous research on the complex relationship between e-learning and student expectation and fulfilment are still in a vacuum when explaining how learning environments affect students' pleasure. It is essential to understand the elements that influence student satisfaction in e-learning that can assist education institutions to enhance their e-learning resources, and teaching and learning techniques that enable students to use e-learning effectively.

Therefore, the purpose of this study is to determine the salient factors that stimulate student expectation and fulfilment with the use of e-learning. By investigating the salient factors, this study will add to the body of knowledge in the information systems discipline related to the adoption of e-learning and how education institutions can strategise their teaching and learning strategy with e-learning. By building upon earlier theoretical models of technology adoption (Davis, 1989) and the e-learning success model (Lee-Post, et al. 2009), this study develops and tests a model with an emphasis on perceived knowledge, perceived ease of use, perceived factors that are unique to the student expectation and fulfilment of e-learning phenomena. For this study, the term "e-learning" refers to an educational approach that uses electronics and digital technology to facilitate distance learning and transmit course materials (Al-Youssef, et al., 2023).

The remainder of this paper is structured as follows: Section 2 reviews relevant literature that includes prior studies on the TAM and E-learning System Success Model and the development of the research model and hypotheses; Section 3 outlines the methodology and estimation strategy; Section 4 presents data analysis and results; Section 5 discusses the findings; and Section 6 concludes with theoretical and practical implications.

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2. Literature Review and Hypotheses Development

In the context of education, e-learning is the use of digital technology and devices to disseminate educational information and facilitate remote learning (Suzianti et al., 2021), while Al-Fraihat et al. (2020) define e-learning as an electronic resource-based, system-based, formalised learning system. They further emphasise e-learning by including digital assets like e-books, e-journals, pre-recorded presentations, and online tests are examples of electronic resources. Through an online meeting platform, students and lecturers can meet, talk, and have class discussions virtually just as in a classroom since the digital learning resources can be uploaded (Fraihat et al. (2020).

The definitions of e-learning have evolved as technology and educational practices have advanced. E-learning, or electronic learning, is broadly defined as the use of digital technologies to facilitate learning and training. In a seminal work, Garrison and Anderson (2003) characterise e-learning as a mode of instruction that involves the use of the internet to deliver educational content and enable interaction among learners, lecturers, and resources. This definition emphasises the connectivity and collaborative aspects of e-learning. This study adopts Hodges et al. (2020) definition of e-learning that is learning that is expedited and backed through the use of information and communication technology (ICT). This definition seems to represent the pivotal role of technology in shaping the e-learning experience.

2.1 Theoretical Background

2.1.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model has been a pivotal theoretical framework for understanding users' acceptance and adoption of technology. Developed by Fred Davis in 1989, TAM posits that perceived ease of use and perceived usefulness significantly influence users' attitudes and intentions to use a technology, which subsequently impacts actual usage behaviour. According to Davis (1989), perceived ease of use is the degree to which a user believes that the system is simple to use and comprehend. Perceived ease of use influences the acceptance and adoption of certain information technologies (computer technologies, services, and software). Perceived ease of use is also referred to as a person's subjective belief that a specific system is simple to use. Perceived usefulness in TAM is preceded by perceived ease of use (Davis, 1989). This is because a user's perception of a new technology or service's usefulness increases with its perceived ease of use. Accordingly, the degree to which an individual thinks that utilising a specific technology will improve his or her job performance can be used to determine perceived usefulness (Davis, 1989).

Over the years, researchers continued to utilise TAM as a foundation for investigating technology acceptance across diverse domains including e-learning, mobile applications, and information systems, to explore user acceptance patterns and factors influencing technology adoption. For example, a study by Li and Wang (2021) examines the adoption of mobile health applications, applying TAM to assess the impact of perceived ease of use and perceived

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usefulness on users' intention to use these applications. The findings reinforced the central tenets of TAM, emphasising the significance of both perceived ease of use and perceived usefulness in shaping users' behavioural intentions. Abdullah and Ward (2016) use TAM in the e-learning context to examine external factors such as self-efficacy, computer anxiety, subjective norm, enjoyment, and past experience. Meanwhile, Šumak et al. (2011) use TAM to explain the acceptance of e-learning behaviour by students. Another study by Wu et al. (2020) explored the acceptance of e-learning platforms among university students, employing TAM as the theoretical framework. They investigate the influence of perceived ease of use and perceived usefulness on students' attitudes toward and intentions to use e-learning technology. The results demonstrate the continued relevance of TAM in understanding students' acceptance of e-learning platforms, with both perceived ease of use and perceived usefulness playing vital roles in shaping user attitudes.

Concerning students' response, Han et al. (2022) employed TAM by surveying 313 university students enrolled in online courses to gauge their acceptance of and satisfaction with e-learning. The findings demonstrate a favourable relationship between perceived utility and perceived ease of use of online courses. Furthermore, their findings indicate that the perceived utility and simplicity of use of online courses had a favourable effect on students' satisfaction with their education and that desire to accept online education was positively impacted by both perceived use and satisfaction, while acceptance intention was not positively impacted by perceived ease of use. Meanwhile, Salloum et al. (2019) conducted a study in five different universities in the United Arab Emirates (UAE) on the use of e-learning using TAM. Their study demonstrates that perceived ease of use of an e-learning system is significantly influenced by computer playfulness, computer self-efficacy, and system quality.

Additionally, it was discovered that the perceived usefulness and ease of use of the e-learning system were positively impacted by the quality of the information, accessibility, and perceived enjoyment. Their findings imply that creating user-friendly systems with an emphasis on functions that learners regularly utilise will help increase their level of satisfaction with online learning. Furthermore, educational institutions should consistently offer guidance and instruction to augment learners' comprehension of employing the virtual learning platform and their assessment of its efficacy, which impacts their general contentment. In summary, studies conducted on e-learning adoption and use have consistently utilised the TAM to examine user acceptance and adoption of various technologies. These studies reinforce the enduring applicability of TAM in diverse contexts, providing valuable insights into the factors that influence users' attitudes, intentions, and behaviours related to technology adoption.

2.1.2 E-learning System Success Model

An e-learning success model was presented by Lee-Post (2009) as a means of directing the planning, creation, and implementation of e-learning programmes which is derived from the information systems success model by DeLone and McLean (2003). Six aspects of success factors: system quality, information quality, service quality, use, user satisfaction, and net benefit are gathered from the literature on the past and integrated into an overall success

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model for information systems. Three success factor dimensions are used to assess the design stage's success: system quality, information quality, and service quality. One success factor, “use” is used to evaluate the delivery stage's success. Ultimately, user satisfaction and net benefits are the two success characteristics used to assess the outcome stage's effectiveness.

The e-learning system success model has emerged as a comprehensive framework to assess and understand the factors influencing the success of e-learning systems. Research on the model has contributed valuable insights into the complex dynamics that determine the effectiveness of digital learning platforms. In a study conducted by Cheng et al. (2019), the e-learning system success model was applied to investigate the success factors of e-learning systems in higher education. The study identifies critical dimensions such as system quality, information quality, service quality, and perceived usefulness, highlighting their significant impact on students’ satisfaction and continued usage of e-learning platforms.

Chopra et al. (2019) validates the dimensions of the E-learning System Success Model (i.e., service quality, system quality, and information quality). It seems that characteristics like promptness, availability, competency, fairness, and responsiveness, teacher-student interactions are key components of service quality. System quality is concerned with features like simplicity of use, security, responsiveness, stability, and friendliness of an e-learning portal or website. The quality of content in terms of organisation, presentation, duration, and clarity is related to information quality. Implications drawn from the E-learning System Success Model studies have practical relevance for educators, administrators, and policymakers involved in designing and implementing e-learning systems. Understanding the multifaceted nature of success factors, as identified by the model, allows stakeholders to tailor interventions and strategies to enhance the overall e-learning experience. For instance, enhancing system quality, ensuring high information quality, and providing adequate support services can contribute to increased user satisfaction and improved outcomes in e-learning.

In addition, findings from the above E-learning System Success Model studies underscore the importance of various factors in shaping the success of e-learning systems. For instance, Li et al. (2020) focuses on the role of instructor support as a key determinant of e-learning success. The study reveals that effective support from instructors positively influenced students' satisfaction, engagement, and overall success in e-learning environments. This finding highlights the interpersonal dimension within the E-learning System Success Model, emphasising the significance of human interaction in the virtual learning space. Kurt (2019) in his study on e-learning system adoption stresses the idea that system and information quality has a substantial impact only on user satisfaction, whereas system quality has a large impact on both system utilisation and user happiness. Furthermore, the author discovered that system success is positively and significantly impacted by both user satisfaction and system usage.

Thus, findings from the E-learning System Success Model research underscore the importance of various factors in shaping the success of e-learning systems. For instance, a study by Li et al. (2020) focused on the role of instructor support as a key determinant of e-learning success. The study reveals that effective support from instructors positively

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influenced students' satisfaction, engagement, and overall success in e-learning environments. Since e-learning provides accessible and flexible learning options, it has become a crucial component of contemporary education. Understanding the elements that impact the success of e-learning is essential as the demand for online education gains momentum. Examining numerous models and frameworks put out in scholarly works to evaluate and forecast the performance of e-learning initiatives is the focus of this study.

2.2 Research Model and Hypotheses Development

2.2.1 Perceived Knowledge and Students' Satisfaction with E-learning

The relationship between perceived knowledge of e-learning and students' satisfaction is integral to understanding the effectiveness of online education. Perceived knowledge in the context of e-learning refers to students' beliefs and confidence in their understanding and mastery of the digital learning environment. When students perceive themselves as knowledgeable and competent users of e-learning platforms, it positively influences their overall satisfaction. A study by Sun and Zhang (2020) finds a significant positive correlation between students' perceived knowledge of e-learning tools and their satisfaction levels. This suggests that as students feel more adept at navigating and utilising the features of e-learning systems, they are likely to experience a greater sense of satisfaction with the learning experience.

Moreover, the positive relationship between perceived knowledge and satisfaction in e-learning is closely tied to the concept of self-efficacy. Bandura's theory of self-efficacy posits that individuals who believe in their ability to perform a task are more likely to engage in that task and experience positive outcomes. In the e-learning context, students with a higher perceived knowledge of the online learning environment are more likely to feel efficacious in their ability to successfully participate in and benefit from the digital learning experience (Bandura, 1994). This sense of self-efficacy contributes to a positive cycle where increased perceived knowledge enhances satisfaction, and heightened satisfaction, in turn, boosts motivation and engagement in the e-learning process. Thus, it hypothesises that;

H1. Perceived Knowledge has a positive effect on students' satisfaction of E-learning

2.2.2 Perceived Ease of use and Students' Satisfaction with E-learning

Perceived ease of use positively influences students' satisfaction with e-learning is grounded in the well-established TAM. According to TAM, perceived ease of use is a crucial factor influencing users' attitudes and intentions to use technology (Davis, 1989). In the context of e-learning, this relationship suggests that when students perceive the e-learning platform as easy to navigate, user-friendly, and accessible, they are more likely to experience higher levels of satisfaction. Empirical studies, such as those by Venkatesh and Davis (2000), have consistently demonstrated the significance of perceived ease of use in shaping user attitudes and acceptance of information technology. Therefore, the relationship builds upon

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this theoretical foundation, proposing a positive relationship between the ease of use of e-learning platforms and students' overall satisfaction.

Moreover, the practical implications of this relationship highlight the importance of designing e-learning environments with a focus on user-friendly interfaces and intuitive navigation. Educators and e-learning designers can leverage these findings to prioritise the development of platforms that reduce technological barriers and enhance the overall user experience. A positive confirmation of the hypothesis through empirical research would reinforce the idea that interventions aimed at improving the perceived ease of use in e-learning platforms can contribute to heightened student satisfaction, ultimately fostering a more positive and effective learning experience in virtual settings. Thus, it is hypothesised that;

H2. Perceived Ease of use has a positive effect on students' satisfaction with E-learning

2.2.3 Perceived Usefulness and Students' Satisfaction with E-learning

Perceived usefulness positively affects students' satisfaction with e-learning draws from the foundational framework of the TAM. According to TAM, perceived usefulness is a critical determinant of users' acceptance and satisfaction with technology (Davis, 1989). In the context of e-learning, this TAM posits that when students perceive the e-learning platform as a valuable tool that enhances their learning outcomes, they are more likely to experience higher levels of satisfaction. This aligns with findings from Venkatesh and Davis (2000), who demonstrated that perceived usefulness significantly influences users' attitudes and satisfaction with information technology. Thus, the relationship between perceived usefulness and attitude establishes a logical connection between the perceived utility of e-learning platforms and the overall satisfaction experienced by students.

Furthermore, the relationship development underscores the practical implications for educators and e-learning designers. If supported by empirical evidence, it suggests that efforts to enhance perceived usefulness, such as emphasising the practical benefits and relevance of e-learning content, can lead to increased student satisfaction. This aligns with the broader goal of optimising e-learning experiences and aligning them more closely with students' educational needs and goals (Wang et al., 2021). By considering the perceived usefulness as a key factor, educators can tailor their instructional strategies and content to maximise the positive impact on students' overall satisfaction in the e-learning environment. Thus, it is hypothesised that;

H3. Perceived usefulness has a positive effect on students' satisfaction with E-learning

An empirical study was designed to test the research framework and the abovementioned hypotheses. Based on the existing literature and previous research framework, this study develops the research framework highlighting the utilisation of e-learning factors (i.e., perceived ease of use, perceived usefulness and perceived knowledge by university students and its impact on student satisfaction. By drawing on the TAM, e-learning systems success model and e-learning literature, an integrated model of e-learning

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adoption by university students in Malaysia is developed. The research model is illustrated in Figure 1.

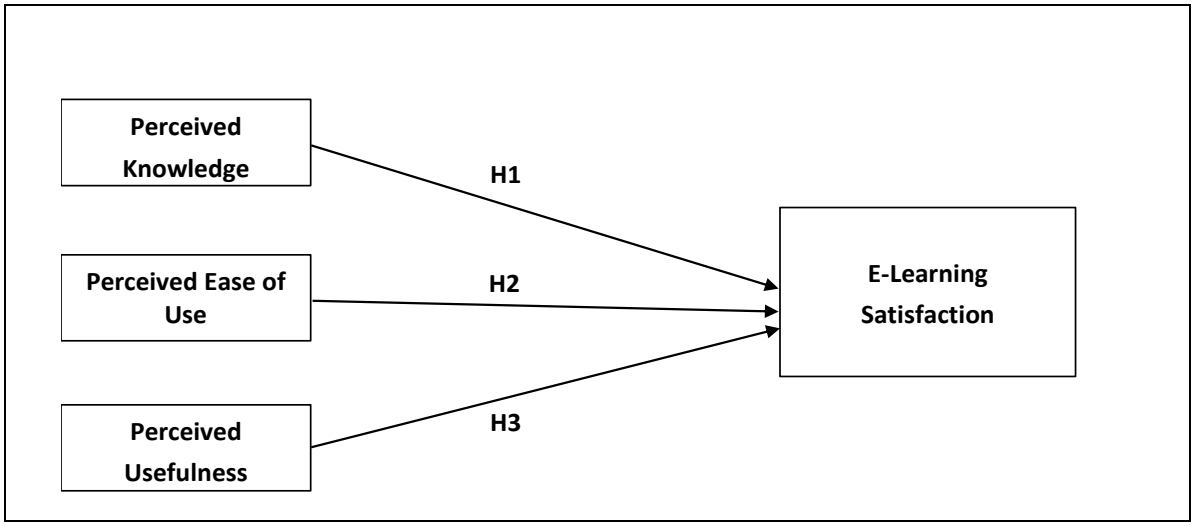

Figure 1. The Research Model of E-Learning Satisfaction

3. Research Methodology

This research employs a quantitative approach that uses primary data in the form of distributing questionnaires to e-learning actors. Data is used through descriptive statistics in this study as the research is based on deductive logic (Saunder et al., 2007). This study collects data based on a cross-sectional study from university students in Malaysia with self -administered questionnaires. The questionnaire deals with the demographic profile of the respondents, which includes the respondents' age, gender of the respondents, race of the respondents, program course and semester of the programme. It is a 5-point Likert scale questionnaire based on three perception variables, which include (1) perceived knowledge, (2) perceived ease of use and (3) perceived usefulness and one criterion variable (i.e., satisfaction with eLearning). The questions for all variables were prepared based on the literature review of the relevant previous studies. Thus, all variables used pre-validated items as their operational measures.

This study uses a purposive and convenience sampling method to enlist university students at a university in Selangor. Purposive and convenience sampling was chosen for the ease of accessibility of the participants. The questionnaires were distributed via an online Google form. A total of 135 respondents participated and completed the questionnaire. In the data analysis procedure, the descriptive statistics of the research variables are given with their mean and standard deviation. The KMO and Bartlett's test is applied to examine the reliability and validity of the construct. The correlation and regression process is performed for hypothesis investigation. All the data analyses in this study are performed using the IBM SPSS Statistical (SPSS) package.

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4. Data Analysis and Results

4.1 Demographic Analysis

The demographic profile of the respondents as shown in Table 1 demonstrates that 36.3% of the students are male, and 63.7% of students are female. A total of 77% of the respondents have an age range of 21– 25 years, 20.7% of their age range is 20 years or less, and the least number of respondents have an age of 26 years old and above. The majority of them are Malay with 71.9%, 2.2% of the respondents were ethnic Chinese, Indian 23.7% students, and others, 2.2%.

Table 1. Demographic Profile

Variable		**Percentage**
Gender	Male	36.3
	Female	63.7
Age	20 years old and below	20.7
	21 years old – 25 years old	77.0
	26 years old and above	2.2
Race	Malay	71.9
	Chinese	2.2
	Indian	23.7
	Others	2.2

4.2 Psychometric Analysis of the Variables

Table 2 describes the descriptive statistics of the results showing the mean and standard deviation for all four variables' i.e., perceived knowledge, perceived ease of use, perceived usefulness, and student satisfaction.

Table 2. Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Perceived Knowledge	135	1	5	3.9531	0.53781
Perceived Ease of Use	135	2	5	3.921	0.57043
Perceived Usefulness	135	2.33	5	3.9321	0.52991
Perceived E-learning Satisfaction	135	2	5	3.7519	0.62257

In this psychometric test analysis, respondents generally express positive perceptions across all variables. On average, participants report a high level of perceived knowledge (mean = 3.9531), indicating a confident understanding of the subject matter, with moderate agreement among responses (std. deviation = 0.53781). The ease of use is also positively perceived, with a mean of 3.921, although opinions vary to a moderate extent among participants, as reflected by a standard deviation of 0.57043. Perceived usefulness is consistently positive, with a mean of 3.9321 and a low standard deviation of 0.52991, indicating a high level of agreement among respondents regarding the subject matter's utility.

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However, when it comes to e-learning satisfaction, while the mean is moderately positive at 3.7519, the higher standard deviation of 0.62257 suggests a more diverse range of opinions and experiences among participants, indicating a greater variability in satisfaction levels with e-learning. The variability in responses, as indicated by standard deviation, varies across these variables, with more agreement on perceived knowledge and usefulness, and relatively more diversity in opinions on ease of use and e-learning satisfaction.

4.2.1 Variables Reliability Test

As shown in Table 3, a high Cronbach's alpha of 0.901 for perceived knowledge indicates a strong internal consistency among the six items in this variable. The Cronbach's alpha of 0.78 for perceived ease of use suggests a moderate level of internal consistency among the three items. The Cronbach's alpha of 0.875 for Perceived usefulness indicates a high level of internal consistency among the six items. Similar to perceived knowledge, this suggests that the items in the Perceived Usefulness variable measure the same underlying construct reliably. Lastly, perceived E-learning satisfaction, measured by three items with a Cronbach's Alpha of 0.821, demonstrates a satisfactory internal consistency, suggesting a reliable measurement of participants' satisfaction with e-learning experiences. Overall, Cronbach's Alpha values affirm the internal reliability of the survey instrument for assessing perceived knowledge, ease of use, usefulness, and e-learning satisfaction.

Table 3. Reliability Test

Variables	N	Cronbach Alpa
Perceived knowledge	6	0.901
Perceived ease of use	3	0.78
Perceived usefulness	6	0.875
Perceived E-Learning satisfaction	3	0.821

4.2.2 Multilayer Perceptron - Artificial Neural Network

As shown in Table 4 Multilayer Perceptron Artificial Neural Networks are versatile in data analysis and capable of capturing intricate patterns and relationships in data. Perceived usefulness has the highest importance among the three variables, with a value of 0.613. Its normalised importance is 100%, indicating that it is the most crucial variable in the model. This variable appears to have the most substantial impact on the model's predictions. The importance values reflect the contribution of each independent variable to the model's predictions. Higher importance values indicate more significant contributions. Perceived Usefulness stands out as the most important variable in this context, followed by Perceived ease of use and perceived knowledge. This information provides insights into the relative importance of independent variables in the Multilayer Perceptron Artificial Neural Network, with Perceived Usefulness being the most influential variable.

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Table 4. Multilayer Perceptron Artificial Neural Network

Independent Variable Importance		
	Importance	Normalized Importance
Perceived knowledge	0.141	23.10%
Perceived ease of use	0.246	40.20%
Perceived usefulness	0.613	100.00%

As shown in Table 5 Kaiser Meyer's measurement adequacy is 0.753, which is greater than 0.6 and Bartlett's test of sphericity is significant to assure that all variables can be processed with the exploratory factor analysis process. The KMO also indicates that construct validity is represented at the extent to which the items in a scale measure the same construct for this study.

Table 5. Kaiser Meyer Measurement

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.837
Bartlett's Test of Sphericity	Approx. Chi-Square	5266.482
	df	1081
	Sig.	<.001

4.3 Hypotheses Testing

The hypotheses were analysed using multiple linear regression analysis following the guidelines established by Hair et al. (1998). The purpose of regression analysis is to relate a dependent variable to a set of independent variables (Mendenhal & Sincich 1993) and find out the ability of each independent variable to explain the dependent variable. Multiple Regression analysis is an appropriate analytical technique for the research question of this study that seeks to find out the relationship between student satisfaction with e-learning (dependent variable) and a set of factors such as perceived knowledge, perceived ease of use, and perceived usefulness (independent variables).

The assumption of multivariate normal distribution, independence of errors, and equality of variance were first tested. Multicollinearity was not a concern with this data set as confirmed by the main effect regression models with variance inflation factors (VIF) ranging from 1.6 to 3.7, as it is well below 10. As can be seen from this data, none of the tolerance levels is < or equal to .01. Generally, a tolerance below 0.1 or a VIF above 10 indicates potential multicollinearity. In this case, all predictors have tolerances well above 0.1, and VIF values are below 10, suggesting no severe multicollinearity issues. Thus, the measures selected for assessing independent variables in this study do not reach levels indicating of multicollinearity (see Table 6).

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Table 6. Test of Collinearity

Variable	Tolerance (TI)	Variance Inflation Factors (VIF)
Perceived knowledge	0.617	1.621
Perceived ease of use	0.355	2.817
Perceived usefulness	0.27	3.697

In Table 7 and Table 8, the results of the individual hypotheses that were being tested are presented. As shown in Table 7, there is a high significant value for both the F-value (44.732) and p value ($p < .001$). The high significance for both F value and p value indicates a very good model fit.

Table 7. Anova Test

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.282	3	8.761	44.732	<.001[b]
	Residual	25.655	131	0.196		
	Total	51.937	134			

a. Dependent Variable: Satisfaction

Table 8. Multiple Regression Results

Variable Constant	Coefficient (b)	t-value	Sig.	Supported
Perceived knowledge	0.009	0.109	0.913	No
Perceived ease of use	0.222	2.157	0.033	Yes
Perceived Usefulness	0.516	4.372	0.000	Yes

R-squared (R^2)	0.506
Adjusted R^2	0.495
F value (sig. level)	44.732

Level of significance of t-value: *$p \leq 0.05$; ** $p \leq 0.001$

As shown in Table 8, two of the three e-Learning factors, i.e., perceived ease of use and perceived usefulness were found to be significant in predicting student satisfaction toward e-learning, while perceived knowledge is not significant. The model explained 49.5 % of the variance in student e-learning satisfaction. The regression model is statistically significant, indicating that at least one predictor has a significant effect on satisfaction. Among the predictors, Perceived Usefulness ($\beta = 0.516$, p value < 0.01) has the most substantial impact, with a higher coefficient and statistical significance. Perceived Ease of Use also has a statistically significant impact ($\beta = 0.2$, p value < 0.05), but perceived knowledge does not appear to contribute significantly ($\beta = 0.009$, p value > 0.05). Therefore, only H2 and H3 support student e-learning satisfaction, while H1 is not supported. Findings are discussed in the section to follow.

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5. Discussion

The purpose of this study is to identify the major factors influencing the satisfaction of e-learning adoption by university students in Malaysia. As mentioned earlier, perceived usefulness and perceived ease of use were found to be significant in predicting student satisfaction with e-learning adoption. The strong effect of perceived usefulness on e-learning satisfaction can be attributed to the fundamental role that utility plays in shaping users' attitudes and experiences. Perceived usefulness in the context of e-learning refers to students' perceptions of the effectiveness and value of the digital learning environment in facilitating their learning goals and outcomes. When students perceive e-learning tools and resources as genuinely beneficial to their educational pursuits, it fosters a sense of fulfilment and achievement, contributing significantly to overall satisfaction (Davis, 1989).

Positive experiences of usefulness create a strong foundation for satisfaction, as students feel that the e-learning platform is instrumental in helping them acquire knowledge, skills, and competencies relevant to their academic and professional aspirations. For instance, a study by Al-qurashi (2020) investigated factors influencing students' acceptance of e-learning in higher education and found that perceived usefulness significantly impacted students' satisfaction. The study highlights the relevance of the TAM framework and the critical role of perceived usefulness in shaping positive user experiences and satisfaction in e-learning contexts. The strong effect of perceived ease of use on e-learning satisfaction can be explained by the impact of user interface design and system accessibility on the overall user experience.

When students find an e-learning platform easy to navigate, understand, and interact with, it minimises the cognitive load and potential frustration, leading to increased satisfaction. This aligns with the user-centered design principles that prioritise creating systems that are intuitive and user-friendly. As technological advancements continue, ensuring that e-learning platforms prioritise ease of use becomes essential in catering to diverse user backgrounds and technical competencies, ultimately influencing satisfaction and the overall success of e-learning initiatives. For example, a study by Al-sabawy et al. (2020) examined factors influencing students' satisfaction with e-learning platforms and identified perceived ease of use as a significant predictor.

The lack of a significant impact of student-perceived knowledge on e-learning satisfaction could be influenced by various factors. One possible reason is that other critical factors, such as the design and usability of the e-learning platform or the quality of instructional materials, may play a more dominant role in shaping students' satisfaction. For example, if the e-learning interface is not user-friendly or the content is not engaging, students might experience dissatisfaction even if they possess the requisite knowledge. If the educational materials are too basic for some or too advanced for others, it can lead to a disconnect between the content and students' existing knowledge (Wang & Li, 2017).

Additionally, the mode of content delivery and instructional design plays a crucial role. If the e-learning platform lacks engagement strategies or fails to cater to diverse learning

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styles, students may struggle to connect their existing knowledge with the presented information (Chen et al., 2021). There is a need for effective pedagogical strategies that bridge the gap between students' prior knowledge and new concepts are essential for maximizing the impact of existing knowledge on satisfaction.

6. Conclusion and Research Implications

This study focuses on students' perceptions of e-learning satisfaction and assesses the applicability of TAM and e-learning systems success model in explaining students' acceptance of E-learning technology in an academic setting. The evaluation involved data from 135 university students in Malaysia. Theoretically, the findings of this study contribute to the ongoing discourse within the Technology Acceptance Model (TAM) framework and e-learning systems success model. The strong positive relationships identified between perceived usefulness, perceived ease of use, and e-learning satisfaction affirm the foundational TAM constructs (Davis, 1989). These results align with the theoretical premise that users are more likely to accept and be satisfied with technology when they perceive it as both useful and easy to use.

Additionally, the inclusion of perceived knowledge in the study extends TAM by highlighting its role in the e-learning context, emphasising that students' perceived knowledge contributes positively to their satisfaction. This theoretical extension adds an understanding of the factors influencing user satisfaction in e-learning environments. Practically, the implications of this study have significant relevance for educators, instructional designers, and e-learning platform developers. Recognising the role of perceived usefulness, practitioners can focus on designing e-learning materials and activities that emphasise the practical benefits and relevance of the content. Moreover, the emphasis on perceived ease of use suggests the importance of creating user-friendly interfaces and intuitive navigation systems within e-learning platforms. Educators can implement training sessions or provide resources to enhance students' technological literacy, fostering a more positive and user-friendly e-learning experience.

Furthermore, acknowledging the positive influence of perceived knowledge on satisfaction, educators can implement strategies to boost students' confidence and competence in using e-learning tools, thereby enhancing overall satisfaction with the digital learning experience. Therefore, it is recommended that to foster students' intention to use technology, a positive perception of the technology's ease of use and perceived usefulness is crucial. Training and information sessions on e-learning should focus primarily on how the technology can improve the efficiency and effectiveness of students' learning processes rather than solely on the procedural aspects of using the technology. In conclusion, future studies are crucial to identify factors contributing to e-learning satisfaction and predict technology acceptability among students.

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